

WHAT IS CLAIMED IS:

1. An optical switch, comprising:
  - one or more thermal drive actuators having associated one or more thermal latch actuators wherein each thermal latch actuator defines translating latch teeth;
  - a movable waveguide shuttle platform defining a plurality of optical waveguides wherein said movable waveguide shuttle platform is connected by suspension elements;
  - a tether connecting said one or more thermal drive actuators to said movable waveguide platform; and
  - a linkage defining one or more linkage teeth for orthogonal connection to said translating latch teeth of said one or more thermal drive actuators located to determine one or more latched state positions wherein electrical stimuli is timed to actuate said one or more thermal drive and thermal latch actuators so as to switch between equilibrium and latched states.
2. The optical switch according to claim 1, wherein said suspension elements are one or more folded springs.
3. The optical switch according to claim 1, wherein said one or more drive actuators are also said suspension elements for said movable shuttle platform.
4. The optical switch according to claim 1, wherein said movable shuttle platform may be deflected bi-directionally.

5. The optical switch according to claim 1, wherein said movable shuttle platform has mechanical features to increase or reduce the stiffness of said movable shuttle platform and said associated suspension.

6. The optical switch according to claim 1, wherein said latching switch is fabricated in the device layer of an SOI wafer.

7. The optical switch according to claim 1, wherein said latching switch is fabricated in the device layer of an SOI wafer and released by sacrificial etching of the buried oxide layer.

8. The optical switch according to claim 1, wherein said electrical stimuli to said latch actuators are biased to reduce electrostatic forces acting on said actuator.

9. The optical switch according to claim 1, wherein said electrical stimuli to said latch actuators are biased to reduce or eliminate voltage differences between contacting surfaces on said latching teeth and said linkage teeth.

10. An optical multiple state latching switch comprising:  
one or more thermal drive actuators;  
one or more thermal latch actuators with associated translating latch teeth;  
a movable shuttle platform defining optical waveguides connected to suspension elements;  
a tether connecting said movable shuttle platform to said translating latch teeth located to determine one or more latched state positions;

a linkage defining one or more linkage teeth for orthogonal connection to said translating latch teeth connecting said tether to a hitch attached to said one or more thermal drive actuators; and

electrical stimuli timed to actuate said thermal drive and thermal latch actuators so as to change between equilibrium and latched states.

11. The optical multiple state latching switch according to Claim 10 wherein said suspension elements are one or more folded springs.

12. The optical multiple state latching switch according to Claim 10 wherein said movable shuttle platform is pulled or pushed by said one or more thermal drive actuators.

13. The optical multiple state latching switch according to Claim 10 wherein said one or more drive actuators are separated from said movable shuttle platform by said hitch.

14. The optical multiple state latching switch according to Claim 10 wherein said movable shuttle platform can be deflected bi-directionally.

15. The optical multiple state latching switch according to Claim 10 wherein said electrical stimuli to said one or more thermal drive actuators are biased to reduce or eliminate voltage differences between contacting surfaces on said latch teeth and said linkage teeth.

16. An optical switch, comprising:  
a plurality of optical waveguides formed on a movable shuttle platform for switching optical states wherein the optical switch is state changed by

utilizing a latching mechanism in association with a thermal drive actuator for aligning said plurality of optical waveguides to a plurality of optical stationary waveguides.

17. The optical switch according to Claim 16, wherein said latching mechanism further comprising one or more drive actuators having associated one or more latch actuators each defining a set of latch teeth.

18. The optical switch according to Claim 16, wherein said movable shuttle platform is suspended and connected by one or more folded springs.

19. The optical switch according to Claim 16, wherein a tether connects said thermal drive actuator and said movable shuttle platform.

20. The optical switch according to Claim 16, wherein a linkage connects said thermal drive actuator to translating latch teeth located to determine one or more latched state positions wherein electrical stimuli is timed to actuate said drive and latch actuators so as to change between equilibrium and latched states.